

EXHIBIT AJ



RBC Capital Markets

December 20, 2018

Alphabet Inc.

The Next Frontier

Our view: While Google remains overwhelmingly an Advertising Revenue company (we estimate 85% of the company's 2018 revenue comes from Advertising), the company has also developed other key businesses. And Hardware, which is included in Alphabet's Other Revenue line, is one of those other key businesses. Here's a deep dive. **Reit Outperform.**

Key points:

Four Key Takeaways: **1)** Google has over the past few years made hardware development and innovation a bigger strategic and engineering focus for the company, via both acquisitions (Nest, HTC) and organic efforts; **2)** The result has been a relatively impressive slate of products (e.g. the Pixel 3 Smartphone, the Nest Learning Thermostat, Google Home SmartSpeakers, and Chromecast SmartTV devices) that have gained critical success and are starting to gain material commercial traction; **3)** In FY18, we estimate that Google's Hardware segment will generate a combined \$8.8B in revenue (6% of Gross Revenue) and \$3.0B in gross profits (4% of Gross Profits), rising to \$19.6B (8%) and \$6.1B (5%), respectively, by 2021; and **4)** We believe that Google's growing Hardware segment has also generated significant strategic benefits for the company, including increased ad monetization opportunities, an end-to-end, controlled method of delivering software/product updates to consumers, and a platform to develop and deploy AI advancements.

Google Home has been a notable success and has gained material traction in the U.S. according to our annual survey of U.S. Internet households, which has shown a broad, dramatic increase in Smart Speaker adoption. In December 2018, 23% of respondents had a Google Home, and we estimate that each household has ~1.7 devices leading to ~43MM Google Home devices currently installed in the U.S. Given the later International rollout, we believe that as of '18 there are ~9MM Google Home devices installed in other Google Home markets. All in, we estimate that in 2018 Google Home generated ~\$3.4B in Revenue, and could grow to ~\$8.2B by 2021.

Reiterate Outperform: Hardware remains a small, but important part of Google given its potential as a key growth avenue and strategic hedge for the company. The largest Ad Revenue-based 'Net business has averaged 23% growth for 35 (keep counting 'em) straight quarters & shows no signs of slowing. Despite a \$130B revenue run-rate. And GOOGL has \$100B+ of net cash on its balance sheet -- dry powder should give investors extra confidence amid market turbulence. That's why we call Alphabet an Internet Staple. And the company's investments in Hardware, Cloud, Internet-connected Homes, and Autonomous Vehicles potentially set the company up for more years of premium growth & profits. There is regulatory risk, though we have yet to find evidence that regulations will adversely impact the usefulness of Google for consumers or advertisers.

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Sector: Internet

Outperform

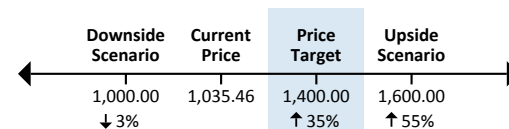
NASDAQ: GOOGL; USD 1,035.46

Price Target USD 1,400.00

WHAT'S INSIDE

<input type="checkbox"/> Rating/Risk Change	<input type="checkbox"/> Price Target Change
<input type="checkbox"/> In-Depth Report	<input type="checkbox"/> Est. Change
<input type="checkbox"/> Preview	<input checked="" type="checkbox"/> News Analysis

Scenario Analysis*



*Implied Total Returns

Key Statistics

Shares O/S (MM):	703.0	Market Cap (MM):	727,928
Dividend:	0.00	Yield:	0.0%
		Avg. Daily Volume:	1,912,253

RBC Estimates

FY Dec	2017A	2018E	2019E	2020E
Revenue	89.2	109.7	132.0	157.8
EBITDA	43,476.0	50,073.0	55,951.0	64,624.0
EPS, Ops Diluted	26.83	59.77	56.59	66.04
P/E	38.6x	17.3x	18.3x	15.7x
Revenue	Q1	Q2	Q3	Q4
2017	20.1A	20.9A	22.3A	25.9A
2018	24.9A	26.2A	27.2A	31.4E
2019	30.2E	31.6E	32.6E	37.6E
EBITDA				
2017	10,080.0A	10,496.0A	11,363.0A	11,537.0A
2018	11,444.0A	12,405.0A	12,895.0A	13,329.0E
2019	12,656.0E	13,951.0E	14,482.0E	14,861.0E

All values in USD unless otherwise noted.

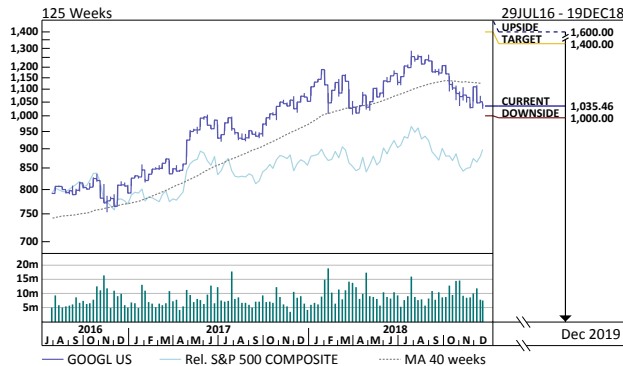


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Internet
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Target/Upside/Downside Scenarios

Exhibit 1: Alphabet Inc.



Source: Bloomberg and RBC Capital Markets estimates for Upside/Downside/Target

Target price/base case

Our \$1,400 PT and 2020 valuation framework is based on a blended average of EV/ Adj. EBITDA and GAAP P/E. We arrive at \$1,400 by applying a 13x Target Multiple on 2020 EBITDA of \$64.6B and 25x Target Multiple on 2020 GAAP EPS of \$55.44. We note that these target multiples are largely in-line with the current multiple the stock is trading on our 2018 estimates. Our price target and the implied return support our Outperform rating.

Upside scenario

In our upside scenario, we think the commercial launch of Waymo in Phoenix at the end of the year serves as a catalyst for the stock in the near/medium term, leading to a potential rerating in GOOGL's multiple. In this scenario, we apply higher P/E (27x vs. 25x) and EV/EBITDA (15x vs. 13x) multiples to our earnings to arrive at our \$1,600 upside scenario.

Downside scenario

In our downside scenario, Alphabet struggles with the transition to mobile, seeing CPCs decline further without a commensurate increase in Paid Clicks. TAC also increases steadily as Google relies more on Partner sites/apps to gain traffic. We apply a lower P/E multiple to arrive at our \$1,000 downside scenario.

Investment summary

Our Outperform rating on Alphabet is based on several key factors:

1) Still Significant Secular Growth for Internet Advertising:

We estimate that Global Internet Ad spend was approximately \$200B in 2017 and Global Net Ad spend will grow mid-teens. That still makes the Internet a sub-40% Media channel in terms of Ad Spend on a global basis, and with incremental Mobile Internet usage surging and TV Ad Budgets likely beginning to tip online, we see still significant secular growth ahead.

2) Very Strong Market Share in Its Core Search Business:

Google has long been the major leader in Search Advertising, accounting for 70%+ of Global Search Ad Revenue. At the margin, its market share has continued to increase, with its very strong position in Mobile and its ongoing innovation likely to continue to expand that share incrementally for the foreseeable future.

3) Leading and Growing Market Share in Other Internet Advertising Segments:

We estimate that Google is one of the largest Display Advertising companies on the Net. And we estimate that Google's key YouTube asset generated ~\$15B in Revenue in 2017, positioning Google extremely well for the strong growth in Video Advertising.

4) Significant Competitive Moats:

We believe that through scale, aggressive product innovation, and very substantial investments in Capex (\$42B over the past five years) and R&D (\$33B over the past five years), Alphabet has established unusually deep competitive moats around its business.

5) An Impressive Track Record of Innovation and Acquisition:

While GOOGL management has been perceived as opaque and non-Street-friendly (though this may be changing), the company has positioned itself well, through organic investments and acquisitions, for most of the major trends in Consumer Internet: Mobile, Video, Local... We have used the term "Shut Up & Deliver Management" to describe (in a positive way, really) the management teams of AMZN and PCLN. The label works with GOOGL as well.

Risks Include: 1) regulatory concerns; 2) competitive risk; 3) mobile monetization; and 4) European macro exposure.



Google Hardware Deep Dive

During the Q3 EPS call, Alphabet CEO Sundar Pichai specifically called out Google's hardware segment as a material new growth driver and highlighted several new key product launches. That got us to wondering... So we went back and reviewed a Google Hardware report we had published in December 2015 (in the pre-FANG era) and decided it was time for an update. Here it is...

...and here are our Four Key Takeaways: 1) Google has over the past few years made hardware development and innovation a bigger strategic and engineering focus for the company, via both acquisitions (Nest, HTC) and organic efforts; 2) The result has been a relatively impressive slate of products (e.g. the Pixel 3 Smartphone, the Nest Learning Thermostat, Google Home SmartSpeakers, and Chromecast SmartTV devices) that have gained critical success and are starting to gain material commercial traction; 3) In FY18, we estimate that Google's Hardware segment will generate a combined \$8.8B in revenue (6% of Gross Revenue) and \$3.0B in gross profits (4% of Gross Profits), rising to \$19.6B (8%) and \$6.1B (5%), respectively, by 2021; and 4) We believe that Google's growing Hardware segment has also generated significant strategic benefits for the company, including increased ad monetization opportunities, an end-to-end, controlled method of delivering software/product updates to consumers, and a platform to develop and deploy AI advancements.

This is what CEO Sundar Pichai said about Google's Hardware business during the Q3 EPS call:

*Every year, we have a new opportunity to push the boundaries of computing. **Those experiences come to life in our Made by Google hardware, which combines the latest advances in software, hardware and AI.** Our third generation is our best yet. It includes The Pixel 3, Google Home Hub, Pixel Slate tablet and more. With the Pixel 3, we've used AI to create a best-in-class camera with new features like top shot that make it so you never miss a shot. If your timing wasn't perfect, the camera will suggest a better frame and give you the option to save it. And Night Sight will help you take really good pictures even in bad light. Pixel 3 also has a custom security chip called Titan M. It was built to secure Google's own datacenters and now we bring it to our users. We also released Google Home Hub, our first smart speaker with a screen. It shows your morning commute, lets you control your smartphone and gives you hands-free help in the kitchen. There is also Pixel Slate, Chrome OS reimaged as a tablet with all the great apps from the Play Store.*

The high-level takeaway for us is that while Google remains overwhelmingly an Advertising Revenue company (we estimate 85% of the company's 2018 revenue comes from Advertising), the company has also developed other key businesses. ([Please see our deep dive on Waymo on 7/10/18](#)). And Hardware, which is included in Alphabet's Other Revenue line, is one of those other key businesses.

All in, we estimate that Google's Hardware suite of products (Pixel, Home, Nest, Chromecast) will generate in 2018 approximately \$8.8B in revenue and \$3.0B in gross profits and that these will amount to 6% of the company Gross Revenue and 4% of the company's Gross Profits. And by 2021, we estimate that Google Hardware will generate \$19.6B in revenue and \$6.1B in gross profits, accounting for 8% of the company's Gross Revenue and 5% of the company's Gross Profits.

We also believe that Google enjoys significant strategic benefits from having a material hardware presence, such as increased ad monetization opportunities, an end-to-end, controlled method of delivering software updates to consumers, and a broad platform for AI development. Additionally, we note Google's hardware presence helps promote overall



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Internet adoption (which is a distinct positive for an Internet Utility) and helps hedge Google from being boxed out of industry Mobile hardware design developments.

Below are our summary estimates for Google's Hardware Revenue and Gross Profit contributions, broken down by product line. And after that, we dig into each of the product lines. Here we go.

Exhibit 2: Hardware Revenue & Gross Profit Contributions

Hardware Contribution (in M)	2016	2017	2018	2019	2020	2021
Pixel Revenues	\$1,233	\$2,403	\$3,423	\$4,373	\$5,678	\$6,915
Nest Revenues	\$520	\$726	\$980	\$1,284	\$1,656	\$2,087
Home Revenues	\$197	\$1,470	\$3,390	\$6,577	\$7,512	\$8,156
Chromecast Revenues	\$560	\$744	\$998	\$1,338	\$1,793	\$2,399
Total Hardware Revenues	\$2,509	\$5,343	\$8,791	\$13,572	\$16,639	\$19,556
Y/Y Growth	--	113%	65%	54%	23%	18%
% of Other Revenues	25%	36%	45%	54%	53%	50%
% of Total Gross Revenue	3%	5%	6%	8%	9%	8%

Hardware Contribution (in M)	2016	2017	2018	2019	2020	2021
Pixel Gross Profit	\$678	\$1,297	\$1,780	\$2,186	\$2,782	\$3,250
Nest Gross Profit	\$130	\$182	\$245	\$321	\$414	\$522
Home Gross Profit	\$49	\$368	\$847	\$1,644	\$1,878	\$2,039
Chromecast Gross Profit	\$56	\$74	\$110	\$147	\$197	\$288
Total Hardware Gross Profits	\$913	\$1,921	\$2,982	\$4,299	\$5,272	\$6,098
Y/Y Growth	--	110%	55%	44%	23%	16%
Blended Gross Margin	36%	36%	34%	32%	32%	31%
% of Total Gross Profit	2%	3%	4%	5%	5%	5%

Source: RBC Capital Markets Estimates, Company Reports, Industry Sources

Pixel


In October 2016, Google released the 1st generation of its Pixel smartphone. The release included two versions, the Pixel and the Pixel XL with a larger screen. The first generation of the Pixel was manufactured by HTC. But in September 2018, right before the release of the 2nd generation Pixel smartphones, Google announced the \$1.1B acqui-hire of the engineering team at HTC that had manufactured the Pixel phones, signaling the company's increased focus on its hardware division. Now in its 3rd generation, the Pixel 3 retails at \$799 while the Pixel 3 XL retails at \$899. And just last week, Google released the Pixel Slate, a tablet powered by Chrome OS.



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Exhibit 3: Current Pixel Suite

Google Pixel	2018	
Pixel 3	\$799	
Pixel 3 XL	\$899	
Pixel Slate (mid tier)	\$799	
Pixelbook (mid tier)	\$1,199	

Source: Company Documents, Industry Sources, The Verge

Reviews for the Pixel 3 have been notably positive since its release. In particular, its top-notch camera and the seamless integration with Google Assistant stand out amongst peers. CNET calls The Pixel 3 the best Android phone of 2018. And here's that review, if you don't want to take our word for it:

Exhibit 4: CNET's Pixel 3 Review

A Holiday Gift Guide Editors' Pick Add to Gift List

The Good: The Pixel 3 takes brilliant photos, even in super low-light, with its single rear lens, and it can capture wide selfie photos. It's water-resistant, has wireless charging, and it can screen unwanted calls.

The Bad: This phone doesn't have expandable memory or a headphone jack. The shot-to-shot camera delay can be sluggish in certain modes.

The Bottom Line: The Pixel 3's truly exceptional cameras and AI-powered call screening give it an edge on the other great phones in 2018's crowded winners' circle.

★★★★★

8.9
OVERALL

Category	Score
DESIGN	10
PERFORMANCE	10
REPRODUCIBILITY	9
QUALITY	9
BATTERY	8

cnet
EDITORS' CHOICE

Source: CNET



Exhibit 5: Google's Pixel 3



Source: CNET

Google's new Pixel Slate, an iPad competitor that runs Chrome OS, has received mixed initial reviews. This is the first tablet from Google that runs Chrome OS instead of Google's Android operating system. According to reviews from The Verge and Android Authority, the Pixel Slate has great hardware and is aesthetically pleasing. However, software integration still could use some improvements, which we assume Google will deliver over time.

Exhibit 6: Google's Pixel Slate (Chrome OS Tablet)



Source: Android Authority



Exhibit 7: Google's Pixel Slate (Chrome OS Tablet) Engadget Review

Engadget Score

Google
Pixel Slate

Pros

- Gorgeous display
- Good battery life
- Excellent speakers
- Full desktop browser on a tablet is extremely useful

Cons

- Performance as a tablet is subpar
- Android apps on Chrome OS are still a confusing (and sometimes buggy) mess
- Very expensive
- Pricey keyboard folio doesn't work well on your lap

Summary

Based purely on its hardware, the Pixel Slate is impressive. Unfortunately, the whole package is hampered by a confusing software experience and a high price. If you're looking for a Chrome device, there are plenty of less expensive options that work just as well, if not better.

Source: Engadget

Based on industry data and our estimates, we believe Google sold 1.7M Pixels in 2016, with an ASP of \$725 and 55% gross margins, the first year the Pixel was released. We forecast \$3.4B in Pixel revenue in 2018 and close to \$1.8B in Gross Profit contribution. Through 2021, we forecast Google will earn 30bps of yearly market share expansion in the Android Premium Smartphone market, leading to 8.3M in Pixel sales, \$6.9B in Pixel revenues, and a Gross Profit of \$3.3B. We have discussed these assumptions with the RBC Hardware team, who believe these are ballpark reasonable. For context, Samsung has >20% of global smartphone market share, per Statista and IDC. And per a report by Counterpoint Research, Samsung has 24% market share of the premium phone segment. Per Gartner 2018 estimates, we can extrapolate a 53% market share of the Android Premium Phone market. If half of these are Galaxy phones, we estimate Samsung's Galaxy phones would represent >25% market share of the Android Premium Phone Segment... materially higher than where we estimate Pixel is today, suggesting ample runway for Pixel gains. We note our Pixel estimates do not include the newly introduced Pixel Slate or Pixelbooks.



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Exhibit 8: RBC Pixel Smartphone Estimates

Premium Phones (in M)	2016	2017	2018	2019	2020	2021
Total (Gartner)	554	588	605	627	640	661
Android (Gartner)	297	251	276	296	324	347
Pixel Android Marketshare	0.6%	1.2%	1.5%	1.8%	2.1%	2.4%
Pixel	1.7	3.1	4.2	5.3	6.8	8.3
ASP	\$725	\$775	\$815	\$825	\$835	\$830
Revenue	\$1,233	\$2,403	\$3,423	\$4,373	\$5,678	\$6,915
Y/Y	--	95%	42%	28%	30%	22%
Gross Margin	55%	54%	52%	50%	49%	47%
Gross Profit	\$678	\$1,297	\$1,780	\$2,186	\$2,782	\$3,250

Source: RBC Capital Markets Estimates, Company Commentary & Documents, HIS Markit Teardown



Nest

Nest, a suite of smart home products Google acquired in 2014 for \$3.2B, was recorded in Google's Other Bets segment until it became part of Other Revenues in Q1:18. From the restated financials, we can back into \$726M in revenues for Nest in 2017 and a (\$621M) profit loss. We forecast Nest will approach \$1B in revenues this year, and greater than \$2.0B in revenues by 2021. These forecasts echo our projections three years ago from our [December 1st 2015 Google report](#):

While we see the potential for substantial value creation out of efforts to develop autonomous vehicles (Google Self-Driving Car Project) and "combat aging" (Calico), we believe that Nest and Google Fiber have business models already in place to generate \$1B+ revenue streams. It's also key to point out that the Other Bets segment is attacking TAMs that are probably well over \$250B in total (\$60B+ Smart Home, \$80B+ U.S. Cable, \$40B+ Autonomous Cars and \$80B+ Aging), creating long-term option value for Alphabet that is likely not fully reflected in GOOGL's valuation.

- RBC Internet Team, December 1st 2015

Exhibit 9: RBC Nest Estimates

Nest Products (in M)	2016	2017	2018	2019	2020	2021
Revenue	\$520	\$726	\$980	\$1,284	\$1,656	\$2,087
Y/Y	--	40%	35%	31%	29%	26%
Gross Margin	25%	25%	25%	25%	25%	25%
Gross Profit	\$130	\$182	\$245	\$321	\$414	\$522
EBIT		(\$621)				

Source: Company Documents, RBC Capital Markets Estimates, Industry Sources

Let's take a step back here. What even is Nest? Google's Nest Product Suite are smart home products which use machine learning to learn your habits to automatically control the temperature while saving energy and money on your heating (10%-12% on average) and cooling (15% on average) bills. It generally knows when you're away and will adjust the temperature accordingly. And you can also control it from anywhere with an internet connection. Nest's main competitors are Ecobee and Honeywell. Nest also offers a range of home security products, like Nest Cam.

Exhibit 10: Current Nest Suite

Nest	2018
Learning Thermostat	\$249
Thermostat E	\$169
Nest Cam (indoor & outdoor)	\$199
Nest Cam IQ (indoor)	\$299
Nest Cam IQ (outdoor)	\$349
Nest Hello	\$229
Nest Secure Alarm System	\$399
Nest Yale Lock	\$249
Nest Protect	\$119

Source: Company Documents, RBC Capital Markets Estimates, Google Images



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Exhibit 11: Current Nest Suite



Source: Company Documents, RBC Capital Markets Estimates, Google Images

The 3rd generation Nest Learning Thermostat offers several new features. Previous Nest thermostats relied on near-field sensors (~3-foot range) to recognize motion activity, while the new version uses a far-field sensor for “Farsight.” Farsight recognizes someone’s presence from up to 20 feet away, and lets them see the thermostat’s target temperature or the current time in analog or digital modes.

Exhibit 12: Nest Learning Thermostat (3rd Gen) CNET Review



Source: CNET Review

Nest Suite also includes Cam IQ Security Cameras for inside (with Google Assistant built-in) and outside your home. Nest Cam IQ utilizes strong processing power to do multiple things. It can distinguish a person from an object and even recognize faces with Nest Aware. The Camera sports a 4K sensor with HDR and intelligent imaging from Google. If an intruder enters your home, a powerful speaker can scare them off. And it will also record everything and cancel out other noises and suppress echoes.



Exhibit 13: Google Nest Cam IQ



Source: Company Documents and Company Website

Additionally, consumers have the option of buying a Nest Aware subscription that will allow continuous recording and saves all information into the cloud. Below are the tiered pricings for subscriptions:

Exhibit 14: Nest Aware Subscriptions

Nest Aware [Subscribe](#)

A subscription in three sizes.

5-day	10-day	30-day
<ul style="list-style-type: none"> 5-day video history 24/7 continuous-recording Intelligent alerts Clips and timelapses Activity Zones 	<ul style="list-style-type: none"> 10-day video history 24/7 continuous-recording Intelligent alerts Clips and timelapses Activity Zones 	<ul style="list-style-type: none"> 30-day video history 24/7 continuous-recording Intelligent alerts Clips and timelapses Activity Zones
<p>\$5 a month</p> <p>\$50 a year</p>	<p>\$10 a month</p> <p>\$100 a year</p>	<p>\$30 a month</p> <p>\$300 a year</p>

Save up to 50% on Nest Aware for additional Nest Cams.

Source: Company Documents & Website



Google Home

The Google Home smart speaker has been a real success and has seen material traction in the U.S. so far. The device is powered by Google Assistant and was released in late 2016 as a competing product to Amazon's Alexa. The following year, Google released the Home Max (high-end speaker) and the Home Mini. By the end of 2017, Google Home was available in the U.S., the UK, France, Canada, Australia, Japan, and Germany. It is also currently available in Italy, Austria, Ireland, Singapore, Spain and India. Google also released the Home Hub in October 2018.

Exhibit 15: Current Google Home Suite

Google Home	2018
Home	\$129
Home Mini	\$49
Home Max	\$399
Home Hub	\$149



Source: Company Documents, RBC Capital Markets Estimates, Industry Sources

Exhibit 16: Google Home CNET Review

A Holiday Gift Guide Editors' Pick

The Good The Google Home accurately answers almost any question you can think to ask. It's loaded with cool features that allow it to make calls, control your smart home, help out in the kitchen and more. (Even sounds pretty good when playing music and controlling your TV.)

The Bad Google's miniature smart speaker still can't do a couple of basic tasks such as take notes. Its sound quality won't be good enough if you're an audiophile. The Google Home has caught up but still doesn't work with as many smart home gadgets as the Amazon Echo.

The Bottom Line The Google Home is a great smart speaker with a ton of capabilities, but you have so many smart speaker options at this point, we're less inclined to recommend this well-balanced middle child.

★★★★★

8.0 OVERALL

DESIGN	8
FEATURES	8
PERFORMANCE	8
PRICE/QUALITY	8

Source: CNET Review



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Exhibit 17: PC Mag Comparison of Smart Speakers

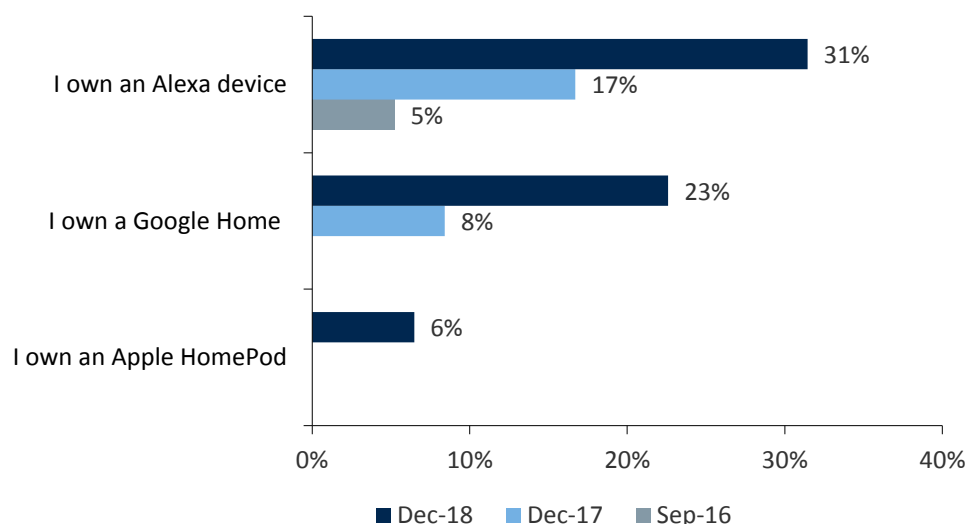
Product	Amazon Echo (2nd Gen, 2017)	Amazon Echo Dot (3rd Gen, 2018)	Amazon Echo Show (2nd Gen, 2018)	Google Home Max	JBL Link View	Sonos Beam	Sonos One	Lenovo Smart Display (10-Inch)	Apple HomePod	Amazon Echo Plus (2nd Gen, 2018)
Lowest Price	\$69.99	\$29.99	\$179.99	\$399.00	\$249.95	\$399.00	\$179.00	\$249.99	\$349.00	\$119.99
	Amazon	Amazon	Amazon	Walmart	Harman Audio	Amazon	Amazon	Lenovo	Apple Store	Amazon
	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT
Editors' Rating	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
	EDITORS' CHOICE	EDITORS' CHOICE	EDITORS' CHOICE	EDITORS' CHOICE	EDITORS' CHOICE	EDITORS' CHOICE	EDITORS' CHOICE	EDITORS' CHOICE	EDITORS' CHOICE	EDITORS' CHOICE
Best For	Amazon Alexa Users	Entry level Alexa Users	Amazon fans	Audio-Focused Google Assistant Users	Google Assistant users	Alexa-Acclimated Audiophiles	Amazon Alexa and Google Assistant Users	Google Fans	Apple-centric Audiophiles	Amazon fans with smart homes
Physical Connections	3.5mm	3.5mm	None	3.5mm, USB-C	None	Optical, HDMI	None	HDMI	None	3.5mm
Bluetooth	✓	✓	✓	✓	—	—	—	—	—	✓
Wi-Fi	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Multi-Room Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Portable	—	—	—	—	—	—	—	—	—	—
Speakerphone	—	✓	—	✓	—	—	—	—	✓	✓
Voice Control	Amazon Alexa	Amazon Alexa	Amazon Alexa	Google Assistant	Google Assistant	Amazon Alexa	Amazon Alexa	Google Assistant	Apple Siri	Amazon Alexa

Source: PC Mag

We surveyed 1,800+ U.S. Internet users this month and saw robust growth across Alexa AND Google Home devices, with 23% of respondents owning a Google Home compared to 8% last December, and 31% of respondents owning an Alexa device compared to 17% in December 2017. These results indicate penetration levels almost doubling Y/Y for Alexa and almost tripling Y/Y for Google Home. Overall, these survey results indicated that Alexa still remains the clear leader in this category, though Google Home is quickly catching up.



Exhibit 18: Penetration Levels by Voice-Activated Device



Source: RBC Capital Markets; Survey Monkey, Alexa: Dec. '18: 1,775, Dec. '17 n=1,855, Sep. '16 n=1,645, Google: Dec. '18: 1,066, Dec. '17 n=1,567, Apple: Dec. '18: 1,806

Using the same methodology as we have used for our Alexa device forecasts, we estimate the addressable market and used our survey work to forecast Google Home penetration and sales. Our addressable market estimates are based on the total households of countries Google Home has been launched in, the Internet penetration of each country, and the date the Google Home suite was released in each country. We see a large opportunity for Google to capture market share overseas in the coming years, given its strong international brand resonance. We also forecast device sales will shift towards lower tiered Google Home Mini (currently ~55% of new Google Home devices) and estimate a lower Blended ASP. Based on industry resources, management commentary, and survey results, we forecast Google will have sold over 50M Google Home devices through 2018, and ~85M devices sold in 2019 alone. By 2021, we forecast Google can reach a global installed base of 278M Smart Speaker devices, and \$8.2B of incremental Revenue in 2021.

Exhibit 19: Google Home Financial Forecasts

Google Home (in M)	2016	2017	2018	2019	2020	2021
Revenue	\$197	\$1,470	\$3,390	\$6,577	\$7,512	\$8,156
Y/Y	--	647%	131%	94%	14%	9%
Gross Margin	25%	25%	25%	25%	25%	25%
Gross Profit	\$49	\$368	\$847	\$1,644	\$1,878	\$2,039

Source: Company Documents, RBC Capital Markets Estimates, Industry Sources



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Alphabet Inc.

Exhibit 20: RBC Google Home Estimates

	2016	2017	2018	2019	2020	2021
U.S. Internet Households (MM)	109	110	111	112	113	114
Google Home Adoption	1%	8%	23%	30%	37%	44%
Devices Per Household	1.4	1.6	1.7	1.8	1.9	2.0
Total U.S. Google Home Devices Installed	2	14	43	60	79	100
Internet Households in Google Home Intl Markets (MM)	0	67	185	210	235	260
Google Home Adoption	0%	1%	3%	18%	29%	36%
Devices Per Household	0.0	1.4	1.6	1.7	1.8	1.9
Total International Google Home Devices Installed	-	1	9	64	123	178
Total Google Home Devices Installed	1.5	15.0	52.3	124.8	202.2	278.3
Total New Google Home Devices Sold	1.5	13.5	37.3	72.5	77.4	76.1
Replacement/ Additional Google Home Devices Sold	0.0	0.0	1.4	12.1	33.5	65.3
Total Google Home Devices Sold	1.5	13.5	38.7	84.7	111.0	141.3
Blended ASP	\$129	\$109	\$88	\$78	\$68	\$58
Google Home Device Revenue (Worldwide)	\$197	\$1,470	\$3,390	\$6,577	\$7,512	\$8,156

Source: RBC Capital Markets Estimates, Company Commentary, CIRP, Statista, Government Census Data

Exhibit 21: RBC Google Home Households Estimates

Google Home Household Calculated	2018	2021
U.S. Households, 2017 est (U.S. Census)	128	129
% using Internet (Pew Research)	87%	88%
Internet Households	111	114
Google Home (Per survey)	23%	44%
Home Households in U.S.	26	50
Int'l Home Households in 2018	6	94
Global Google Home Households	31	144

Source: Company Documents, RBC Capital Markets Estimates, Industry Sources



Chromecast

Initially released in 2013, Chromecast has evolved into a streaming dongle that enables Android devices and Chrome browsers to stream video directly to a TV. Chromecasts are currently priced at \$35 for the HD version and \$69 for 4K (Chromecast Ultra). As of August 2017, Google had sold more than 55M Chromecast dongles and Chromecast built-in devices, announced during Google's Made by Google hardware event in Mountain View. Its primary competitors are Roku, Amazon Fire TV, and Apple TV.

Exhibit 22: Google Chromecasts (3rd Gen)

Chromecast	2018
Chromecast	\$35
Chromecast Ultra	\$69



Source: Company Documents & Website

Exhibit 23: Google Chromecast CNET Review

A Holiday Gift Guide Editors' Pick

Add to Gift List +

The Good The super-affordable Chromecast streams Netflix, YouTube, Spotify, Pandora, HBO Now and thousands of other apps and games to your TV using an smartphone, PC, or even voice as the controller. It hides neatly behind your TV.

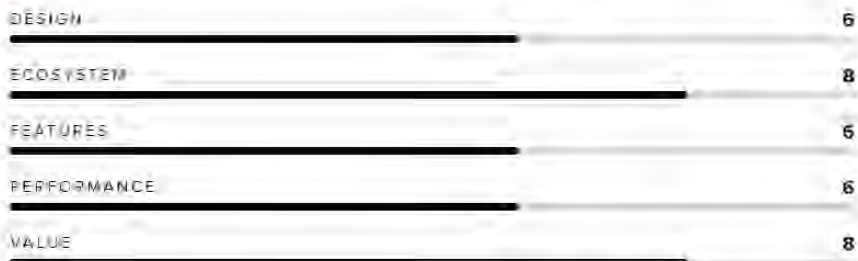
The Bad The lack of a dedicated remote means you always need a smartphone, tablet or PC nearby to use it. Competitors at the same price offer physical remotes and onscreen displays, which are easier to use. There still no app support for Amazon Prime Video.

The Bottom Line The newest version of Google Chromecast is basically identical to the old one and falls short of the budget competition from Amazon and Roku.



7.2

OVERALL



Source: CNET Review



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Below is a table of aggregated media streaming reviews from PC Mag. Google's Chromecast Ultra ranks behind the leading Roku and Amazon streaming devices, but still garners generally positive reviews.

Exhibit 24: PC Mag Comparison of Media Streaming Devices

Product	Amazon Fire TV Cube	Amazon Fire TV Stick 4K	Amazon Fire TV Stick With Alexa Voice Remote	Roku Premiere+ (2018)	Apple TV 4K	Google Chromecast Ultra	Nvidia Shield TV (2017)	Roku Ultra (2017)	Google Chromecast (2018)	Roku Premiere (2018)
										
	\$69.99	\$34.99	\$24.99	\$49.99	\$199.00	\$69.00	\$169.00	\$89.00	\$35.00	\$39.99
Lowest Price	Amazon	Amazon	Amazon	Walmart	Walmart	Walmart	Amazon	Amazon	Walmart	Amazon
	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT	SEE IT
Editors' Rating	★★★★★ EDITORS' CHOICE	★★★★★ EDITORS' CHOICE	★★★★★ EDITORS' CHOICE	★★★★★ EDITORS' CHOICE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Best For	Hands-free Amazon fans	4K HDR cord-cutters	Budget-minded Amazon fans	Budget-minded cinephiles	Apple fans	Android users	Hands-free Google fans	Privacy-minded movie lovers	Budget-minded Android users	Budget-minded cinephiles
Internal Storage	16 GB	0 GB	16 GB	0 GB	32 GB	0 GB	16 GB	0 GB	0 GB	0 GB
4K	✓	✓	—	✓	✓	✓	✓	✓	—	✓
HDR	HDR10	Dolby Vision, HDR10	HDR10	HDR10	HDR10, Dolby Vision	Dolby Vision, HDR10	Dolby Vision, HDR10	HDR10	No	HDR10
Online Content Services	Amazon Fire TV App Store	Amazon Fire TV App Store	Amazon Video, Amazon Music, Amazon Fire TV App Store	Roku Channel Store	tvOS	Google Cast	Android TV	Roku Channel Store	Google Cast	Roku Channel Store
Web Browser	Yes	Yes	No	No	No	Yes	No	No	No	No
Smartphone/Tablet Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voice Control	Amazon Alexa	Amazon Alexa	Amazon Alexa	Search	Apple Siri	None	Google Assistant	Search	Google Assistant	Search

Source: PC Mag



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Based on company remarks and our estimates, we believe Google sold 20M Chromecasts in 2016, with an ASP of \$28 and 10% gross margins. We forecast \$1.0B in Chromecast revenue in 2018 and close to \$0.1B in Gross Profit contribution. Through 2021, we forecast 30% unit sales growth through 2021, leading to 69M in Chromecast sales in 2021, \$2.4B in Chromecast revenues, and a Gross Profit of \$0.3B.

Exhibit 25: Google Chromecast Financial Forecasts

Chromecasts (in M)	2016	2017	2018	2019	2020	2021
Chromecasts	20	24	31	41	53	69
ASP	\$28	\$31	\$32	\$33	\$34	\$35
Revenue	\$560	\$744	\$998	\$1,338	\$1,793	\$2,399
Y/Y	--	33%	34%	34%	34%	34%
Gross Margin	10%	10%	11%	11%	11%	12%
Gross Profit	\$56	\$74	\$110	\$147	\$197	\$288

Source: Company Documents, RBC Capital Markets Estimates, Roku Company Documents, Company Remarks



Chromebook

Based on Gartner and our estimates, we believe there were 11.9MM Chromebooks sold in 2018. By 2021, we estimate 15.4MM Chromebooks sold. And based on our conversations with the RBC Hardware team, we believe Google receives revenue for its Chromebook licenses, unlike its Android OS. But we are not including these Revenues into our Hardware estimates as this would manifest as software/licensing revenue in Other Revenues. However, over time, Google could sell this amount of Pixelbooks, which would be considered Google Hardware but we are not currently including in our current forecasts.

Exhibit 26: Google Chromebook Estimates

Chromebooks (in M)	2016	2017	2018	2019	2020	2021
Chromebooks	9.4	10.9	11.9	13.0	14.1	15.4
Average Selling Price	\$550	\$601	\$652	\$703	\$755	\$808
Gross Revenue	\$5,170	\$6,547	\$7,755	\$9,122	\$10,667	\$12,409
Take Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Google Revenue	258.5	327.3	387.7	456.1	533.3	620.5
Y/Y	52%	27%	18%	18%	17%	16%

Source: RBC Capital Markets, Gartner



Alphabet Valuation

Our \$1,400 PT and 2020 valuation framework is based on a blended average of EV/ Adj. EBITDA and GAAP P/E. We arrive at \$1,400 by applying a 13x Target Multiple on 2020 EBITDA of \$64.6B and 25x Target Multiple on 2020 GAAP EPS of \$55.44. We note that these target multiples are largely in-line with the current multiple the stock is trading on our 2018 estimates. We believe the regulatory overhang has created pressure on Google's multiple, and that the Android fine may suggest that peak regulatory risk is now in the rear view mirror. Moreover, we believe the commercialization of Waymo could be a catalyst for the stock in the near/medium term, leading to a potential rerating in GOOGL's multiple.

Exhibit 27: GOOGL Multiples Based Valuation Methodology

(\$ in millions, except per share amounts)

Current Price	\$1,026
Shares Outstanding (MM)	703
Current Market Cap	\$721,285
Less: Cash (incl. Non-Marketable)	\$115,716
Plus: Debt	\$3,986
Enterprise Value	\$609,555

Price to Earnings	2020E
GAAP EPS	\$55.44
P/E on '18 GAAP EPS	24.4x
P/E on '19 GAAP EPS	22.1x
P/E on '20 GAAP EPS	18.5x
Adjusted EBITDA CAGR '18-'21	15%
Target Multiple	25x
Implied Stock Price on Forward EPS	\$1,386

EV to Adjusted EBITDA	2020E
Adjusted EBITDA	\$64,624
EV/EBITDA on '18 Adjusted EBITDA	12.2x
EV/EBITDA on '19 Adjusted EBITDA	10.9x
EV/EBITDA on '20 Adjusted EBITDA	9.4x
Adjusted EBITDA CAGR '18-'21	15%
Target Multiple	13x
Enterprise Value	\$840,116
Plus: YE 2019 Net Cash	\$121,349
Equity Market Capitalization	\$961,465
Implied Stock Price on Forward EBITDA	\$1,367

Target Price (Rounded) **\$1,400**

Source: FactSet, RBC Capital Markets (priced as of December 17th, at market close)



Valuation

Our \$1,400 PT and 2020 valuation framework is based on a blended average of EV/ Adj. EBITDA and GAAP P/E. We arrive at \$1,400 by applying a 13x Target Multiple on 2020 EBITDA of \$64.6B and 25x Target Multiple on 2020 GAAP EPS of \$55.44. We note that these target multiples are largely in-line with the current multiple the stock is trading on our 2018 estimates. We believe the regulatory overhang has created pressure on Google's multiple, and that the Android fine may suggest that peak regulatory risk is now in the rear view mirror. Moreover, we believe the commercialization of Waymo could be a catalyst for the stock in the near/medium term, leading to a potential rerating in GOOGL's multiple. Our price target and the implied return supports our Outperform rating.

Risks to rating and price target

1) Regulatory concerns; 2) competitive risk; 3) mobile monetization; and 4) European macro exposure.

Company description

Alphabet is a top search destination on the Web and provides a leading search marketing platform for advertisers and merchants.



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Alphabet - Income Statement (\$ Millions Except EPS)

	2017A				2018E				2019E									
	3/17A	6/17A	9/17A	12/17A	3/18A	6/18A	9/18A	12/18E	3/19E	6/19E	9/19E	12/19E	2016A	2017A	2018E	2019E	2020E	2021E
Total Revenue - Gross	24,750	26,010	27,772	32,323	31,146	32,657	33,740	38,899	37,442	39,190	40,500	46,585	90,272	110,855	136,442	163,717	194,885	230,310
Total Revenue - Net	20,121	20,919	22,270	25,873	24,858	26,237	27,158	31,410	30,224	31,557	32,596	37,644	73,479	89,183	109,663	132,020	157,825	187,211
Traffic Acquisition Costs	4,629	5,091	5,502	6,450	6,288	6,420	6,582	7,489	7,219	7,633	7,904	8,941	16,793	21,672	26,779	31,697	37,060	43,100
Operating Expense	13,553	16,787	14,488	18,209	17,857	23,430	18,848	22,765	22,316	22,397	22,948	27,660	49,763	63,037	82,900	95,321	113,952	133,859
Other Cost of Revenue	5,166	5,282	5,646	7,817	7,179	7,463	7,699	10,118	9,333	9,292	9,566	12,503	18,345	23,911	32,459	40,694	49,437	58,642
Research & Development	3,942	4,172	4,205	4,306	5,039	5,114	5,232	5,290	6,187	6,214	6,345	6,416	13,948	16,625	20,675	25,162	30,080	35,306
Sales & Marketing	2,644	2,897	3,042	4,310	3,604	3,780	3,849	5,327	4,473	4,641	4,717	6,497	10,485	12,893	16,560	20,328	23,985	28,077
G&A	1,801	1,700	1,595	1,776	2,035	2,002	2,068	2,030	2,323	2,250	2,319	2,245	6,985	6,872	8,135	9,138	10,450	11,834
Stock-Based Compensation	2,009	2,003	1,820	1,847	2,457	2,413	2,230	2,230	2,230	2,230	2,230	2,230	6,703	7,679	9,330	8,920	9,420	9,920
Other	0	2,736	0	0	0	5,071	0	0	0	0	0	0	0	2,736	5,071	0	0	0
Operating Income	6,568	4,132	7,782	7,664	7,001	2,807	8,310	8,644	7,908	9,160	9,648	9,984	23,716	26,146	26,762	36,699	43,872	53,352
Non-GAAP Op Inc (ex/ 1x)	6,568	6,868	7,782	7,664	7,001	7,878	8,310	8,644	7,908	9,160	9,648	9,984	30,419	36,561	41,163	45,619	53,292	63,272
D&A	1,503	1,625	1,761	2,026	1,986	2,114	2,355	2,455	2,519	2,562	2,604	2,647	6,144	6,915	8,910	10,332	11,332	12,332
Adjusted EBITDA	10,080	10,496	11,363	11,537	11,444	12,405	12,895	13,329	12,656	13,951	14,482	14,861	36,563	43,476	50,073	55,951	64,624	75,604
Interest Income And Other, Net	251	245	197	354	3,542	1,408	1,773	500	500	500	500	500	434	1,047	7,223	2,000	2,500	3,000
Pretax Income	6,819	4,377	7,979	8,018	10,543	4,215	10,083	9,144	8,408	9,660	10,148	10,484	24,150	27,193	33,985	38,699	46,372	56,352
Provision for income taxes	1,393	853	1,247	11,038	1,142	1,020	891	1,372	1,261	1,449	1,522	1,573	4,672	14,531	4,425	5,805	6,956	8,453
GAAP Net Income	5,426	3,524	6,732	(3,020)	9,401	3,195	9,192	7,773	7,147	8,211	8,626	8,911	19,478	12,662	29,561	32,894	39,416	47,899
Non-GAAP Net Income	7,033	5,126	8,188	(1,542)	11,367	5,125	10,976	9,557	8,931	9,995	10,410	10,695	24,031	18,805	37,025	40,030	46,952	55,835
GAAP EPS	\$7.73	\$5.01	\$9.57	(\$4.35)	\$13.33	\$4.54	\$13.06	\$11.03	\$10.12	\$11.62	\$12.19	\$12.57	\$27.88	\$18.06	\$41.97	\$46.50	\$55.44	\$66.99
Non-GAAP EPS	\$10.02	\$7.29	\$11.64	(\$2.22)	\$16.12	\$7.29	\$15.59	\$13.56	\$12.65	\$14.14	\$14.71	\$15.09	\$34.39	\$26.83	\$52.57	\$56.59	\$66.04	\$78.09
Fully diluted shares	702	704	704	695	705	703	704	705	706	707	708	709	699	701	704	707	711	715
Growth Rate																		
Gross Revenue (Y/Y)	22%	21%	24%	24%	26%	26%	21%	20%	20%	20%	20%	20%	20%	23%	23%	20%	19%	18%
Gross Revenue (Q/Q)	-5%	5%	7%	16%	-4%	5%	3%	15%	-4%	5%	3%	15%	--	--	--	--	--	--
Net Revenue (Y/Y)	22%	19%	22%	22%	24%	25%	22%	21%	22%	20%	20%	20%	21%	21%	23%	20%	20%	19%
Net Revenue (Q/Q)	-5%	4%	6%	16%	-4%	6%	4%	16%	-4%	4%	3%	15%	--	--	--	--	--	--
Opex (Y/Y)	22%	45%	16%	25%	32%	40%	30%	25%	-4%	22%	22%	22%	21%	27%	32%	15%	20%	17%
Adjusted EBITDA (Y/Y)	23%	17%	23%	13%	14%	18%	13%	16%	11%	12%	12%	11%	23%	19%	15%	12%	16%	17%
Non-GAAP Operating Inc. (Y/Y)	-4%	-8%	2%	-10%	7%	15%	7%	13%	13%	16%	16%	15%	24%	20%	13%	11%	17%	19%
GAAP EPS (Y/Y)	28%	-28%	32%	-157%	72%	-9%	37%	-354%	-24%	156%	-7%	14%	18%	-35%	132%	11%	19%	21%
PF EPS (Y/Y)	33%	-13%	28%	-124%	61%	0%	34%	-711%	-22%	94%	-6%	11%	16%	-22%	96%	8%	17%	18%
Margin Analysis																		
TAC	18.7%	19.6%	19.8%	20.0%	20.2%	19.7%	19.5%	19.3%	19.3%	19.5%	19.5%	19.2%	18.6%	19.5%	19.6%	19.4%	19.0%	18.7%
GAAP Operating Margin - Net	32.6%	32.8%	34.9%	29.6%	28.2%	10.7%	30.6%	27.5%	26.2%	29.0%	29.6%	26.5%	32.3%	29.3%	24.4%	27.8%	27.8%	28.5%
GAAP Operating Margin - Gross	26.5%	15.9%	28.0%	23.7%	22.5%	8.6%	24.6%	22.2%	21.1%	23.4%	23.8%	21.4%	26.3%	23.6%	19.6%	22.4%	22.5%	23.2%
Non-GAAP Operating Margin - Net	32.6%	32.8%	34.9%	29.6%	28.2%	30.0%	30.6%	27.5%	26.2%	29.0%	29.6%	26.5%	41.4%	41.0%	37.5%	34.6%	33.8%	33.8%
Y/Y Change	-8.7%	-9.80%	-6.80%	-10.37%	-4.48%	-2.81%	-4.35%	-2.10%	-2.00%	-1.00%	-1.00%	-1.00%	0.90%	-0.40%	-3.46%	-2.98%	-0.79%	0.03%
Tax Rate	20.4%	19.5%	15.6%	137.7%	10.8%	24.2%	8.8%	15.0%	15.0%	15.0%	15.0%	15.0%	19.3%	53.4%	13.0%	15.0%	15.0%	15.0%

Source: RBC Capital Markets estimates, Company Reports



Required disclosures

Conflicts disclosures

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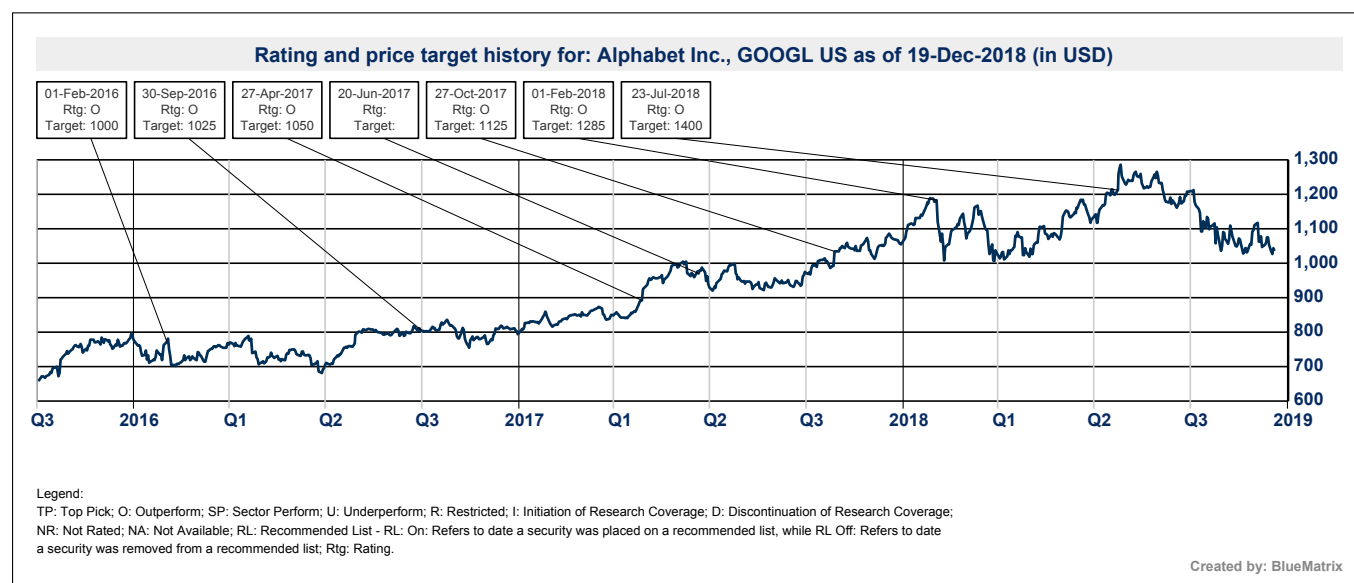
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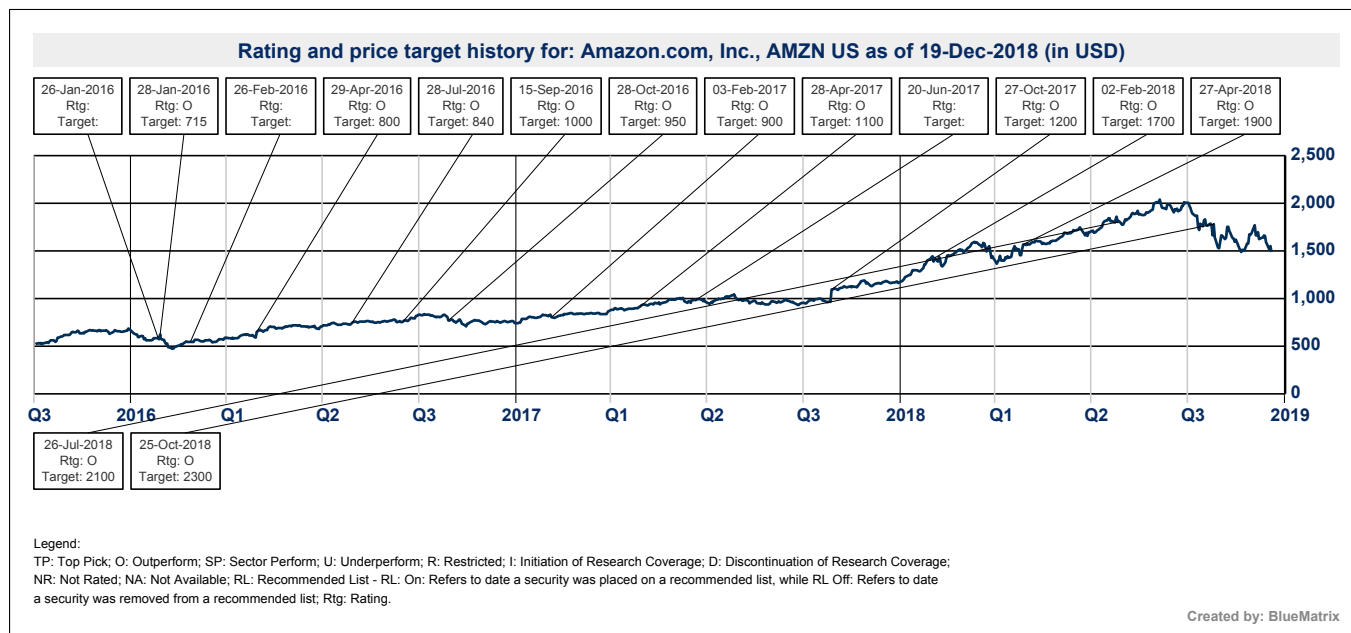
Distribution of ratings RBC Capital Markets, Equity Research As of 30-Sep-2018				
Rating	Count	Percent	Investment Banking Serv./Past 12 Mos.	
			Count	Percent
BUY [Top Pick & Outperform]	859	54.33	251	29.22
HOLD [Sector Perform]	646	40.86	125	19.35
SELL [Underperform]	76	4.81	5	6.58





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Alphabet Inc.

Valuation

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Risks to rating and price target

1) Regulatory concerns; 2) competitive risk; 3) mobile monetization; and 4) European macro exposure.

Amazon.com, Inc.

Valuation

- Our PT of \$2,300 is based on '20E EV/Adjusted EBITDA methodology. Our EV/EBITDA Valuation framework applies a 20x Target Multiple to our '20 Adjusted EBITDA estimate of \$55B to arrive at a \$2,300 value. Our estimates imply a 3-year 28% EBITDA


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CAGR for AMZN, which we believe reasonably supports a Target Multiple of 20x on a growth-adjusted basis. Our price target supports our Outperform rating.

Risks to rating and price target

- Increase in competitive intensity either from online competitors or online segments of traditional retailers.
- Additional gross margin pressure from rising oil prices, operating margin pressure from continued investments in technology, and potential for additional international expansion.
- Decrease in e-commerce activity by consumers.

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